DOCUMENT RESUME

ED 383 925 CE 069 338

AUTHOR Neumark, David
TITLE Employment Effects of Minimum and Subminimum Wages. Recent Evidence.
INSTITUTION Employment Policies Inst., Washington, DC.
PUB DATE Feb 93
NOTE 40p.
PUB TYPE Reports - Research/Technical (143)

EDRS PRICE MF01/PC02 Plus Postage.
DESCRIPTORS Adult Education; Career Education; *Employment Patterns; *Employment Practices; *Minimum Wage; Secondary Education; *Student Employment; *Unemployment; Vocational Education; Wages; *Youth Employment; Youth Problems

ABSTRACT

Using a specially constructed panel data set on state minimum wage laws and labor market conditions, Neumark and Wascher (1992) presented evidence that countered the claim that minimum wages could be raised with no cost to employment. They concluded that estimates indicating that minimum wages reduced employment on the order of 1-2 percent for a 10 percent increase in minimum wages were correct. They showed that minimum wages had lagged effects; that is, they took more than a year to have their full effects on employment. When there were lagged effects, estimates based on the relationship between minimum wages and employment "within" a year understated the disemployment effect of minimum wages. When lagged effects were ignored, the estimation method Card (1992) used had a particularly strong tendency to produce incorrect estimates indicating that minimum wages did not reduce employment and perhaps even indicating they increased employment. Neumark and Wascher examined individual states that have sometimes implemented exemptions from state minimum wage levels for specific subgroups of the labor force. Using 13 or more years of panel data for all 50 states and the District of Columbia, they found evidence that state subminimum wage provisions are utilized by employers and that a training wage equal to 85 percent of the minimum wage substantially moderated the disemployment effects of minimum wages for teenagers. This reverses findings by Lawrence Katz and Alan Krueger, who relied on a single year's worth of data for one industry in one state. (Appendixes to the report include methodology and findings from the Neumark-Wascher estimation; evidence on student and youth subminimum wage provisions; and the state minimum wage panel data set. Contains 21 references.) (YLB)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

EMPLOYMENT POLICIES INSTITUTE

ED 383 925

EMPLOYMENT EFFECTS OF MINIMUM AND SUBMINIMUM WAGES

RECENT EVIDENCE

DAVID NEUMARK
University of Pennsylvania

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)
☒ This document has been reproduced as received from the person or organization originating it
☐ Minor changes have been made to improve reproduction quality
• Points of view or opinions stated in this document do not necessarily represent official OERI position or policy

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

CE 065 338

BEST COPY AVAILABLE

February 1993

Suite 1110 607 14th Street, N.W. Washington, D.C. 20005 (202) 347-5178 Fax: (202) 347-5250

The Employment Policies Institute is a nonprofit research organization dedicated to expanding employment opportunities at all levels of America's economy. In particular, EPI believes that entry-level positions often provide the best job-training and education programs that many Americans, especially young Americans and those seeking to move from welfare to work, can have. By ensuring that these entry-level opportunities are preserved for those seeking a port of entry into the workforce, America can make substantial improvements in both unemployment and long term productivity.

David Neumark *is Assistant Professor of Economics at the University of Pennsylvania and Faculty Research Fellow of the National Bureau of Economic Research.* *This paper draws on research conducted jointly with William Wascher, Senior Economist for the Board of Governors, Federal Reserve System. I am grateful to William Wascher for this collaboration, to Orley Ashenfelter, Charles Brown, Andrew Foster, Daniel Hamermesh, George Jakubsen, Alan Krueger, Paul Taubman, Wayne Vroman, and Ron Warren for helpful comments on this research, to Donna Boswell and Richard Johnson for research assistance, and to Wayne Vroman for providing the minimum wage data for Washington, D.C.*

EMPLOYMENT
POLICIES
INSTITUTE

EMPLOYMENT EFFECTS OF MINIMUM AND SUBMINIMUM WAGES

RECENT EVIDENCE

DAVID NEUMARK
University of Pennsylvania

February 1993

Suite 1110 607 14th Street, N.W. Washington, D.C. 20005 (202) 347-5178 Fax: (202) 347-5250

TABLE OF CONTENTS

Executive Summary i

Introduction 1

Recent Research on Minimum Wage Effects on Employment 2

Recent Research on Subminimum Wages 6

Conclusion 7

APPENDICES

A: Methodology and Findings from the Neumark-Wascher Estimation A-1

B: Evidence on Student and Youth Subminimum Wage Provisions B-1

C: The State Minimum Wage Panel Data Set C-1

TABLES

1: Estimates of the Percent Change in Employment-to-Population Ratios from a Ten Percent Increase in the Minimum Wage, "Within-Group" Estimates A-3

2: Estimates of the Percent Change in Employment-to-Population Ratios from a Ten Percent in the Minimum Wage, "First-Difference" Estimates A-6

3: Estimates of the Percent Change in Employment-to-Population Ratios from a Ten Percent Increase in the Minimum Wage, Specification Allowing Lagged Effects of Minimum Wages, "Within-Group" and "First-Difference" Estimates A-8

4: Estimates of the Percentage Reduction of the Disemployment Effect of a $4.25 Minimum Wage from Implementing An 85% ($3.61) Subminimum Wage, "Within-Group" Estimates B-2

5: State Minimum Wage Levels C-2

6: Proportions of States with Student/Apprentice and Youth Subminimum Wages C-5

References

EXECUTIVE SUMMARY

Recent research on minimum wages has revived the debate over the effects of minimum wage laws on employment. The long accepted view, especially since the report of the Minimum Wage Study Commission in 1981, has been that increases in the minimum wage negatively affect employment, decreasing it below the level that would have otherwise occurred. Beginning in 1991, however, this view was challenged by studies that found no negative effect on employment from minimum wages increases — what some have called the "new view" on minimum wages. In 1992, however, research by David Neumark and William Wascher found that some of the methodology and data sets which led to this new view generated erroneous estimates of minimum wages effects.

This paper reviews the evidence presented in Neumark and Wascher that bears directly on the conflicting findings in this new research on minimum wages. It explains economists' approaches to studying the minimum wage effects, reviews the findings from recent research, and summarizes the evidence presented in Neumark and Wascher which counters the claim that minimum wages can be raised with no cost to employment.

Neumark and Wascher showed that minimum wages have lagged effects; that is, they take more than a year to have their full effects on employment. The best known of the studies finding no impact on employment from the minimum wage, by David Card, did not take these lagged effects into account.

Neumark and Wascher concluded that estimates which indicate that minimum wages reduce employment on the order of 1 to 2 percent for a 10 percent increase in minimum wages, are in fact the correct ones, a finding in line with the Minimum Wage Study Commission report.

Neumark and Wascher showed that minimum wages have lagged effects; that is, they take more than a year to have their full effects on employment. The best known of the studies finding no impact on employment from the minimum wage, by David Card, did not take these lagged effects into account. When there are lagged effects, estimates based on the relationship between minimum wages and employment *within* a year understate the disemployment effect of

minimum wages. Moreover, when lagged effects are ignored, the estimation method that Card uses has a particularly strong tendency to incorrectly produce estimates indicating that minimum wages do not reduce employment, and perhaps even indicating that they increase employment. Neumark and Wascher demonstrated that once these lags are taken into account, the evidence shows that minimum wages do, in fact, reduce employment of teens and young adults.

Moreover, when lagged effects are ignored, the estimation method that Card uses has a particularly strong tendency to incorrectly produce estimates indicating that minimum wages do not reduce employment...

The second major focus of the new view on minimum wages has been the ability of subminimum training wages to mitigate the disemployment effect of minimum wages. Neumark and Wascher examined individual states which have sometimes implemented exemptions from state minimum wage levels for specific subgroups of the labor force such as teenagers, apprentices, or students. Using thirteen or more years of panel data for all 50 states and the District of Columbia, Neumark and Wascher found evidence that state subminimum wage provisions are utilized by employers and that a training wage equal to 85 percent of the minimum wage (paralleling the federal training subminimum) substantially moderates the disemployment effects of minimum wages for teenagers. This reverses findings by Lawrence Katz and Alan Krueger, who relied on a single year's worth of data for one industry in one state.

Using thirteen or more years of panel data for all 50 states and the District of Columbia, Neumark and Wascher found evidence that state subminimum wage provisions are utilized by employers and that a training wage ... substantially moderates the disemployment effects of minimum wages for teenagers. This reverses findings by Lawrence Katz and Alan Krueger who relied on a single year's worth of data for one industry in one state.

There can be no doubt that the renewed interest in the effect of the minimum wage on employment and earnings has addressed many of the objections that were legitimately leveled against prior work in this area. By relying on data that included state-specific minimum wages

in addition to the federal minimum (as proponents of the new view have done) it is now possible to capture more fully the effects of the minimum wage. Notwithstanding the important contribution that this research has made, it is not without its own shortcomings. Once these are corrected the new view of minimum wages must be seen as reinforcing, not replacing, the long held view that minimum wages adversely affect the market for entry-level labor, particularly among young workers.

Carlos Bonilla
Employment Policies Institute

INTRODUCTION

A federal minimum wage was first implemented in the United States in 1938 with the passage of the Fair Labor Standards Act (FLSA), which now covers more than 90 percent of all workers. A standard textbook model of the labor market predicts that an effective minimum wage (*i.e.*, a minimum above the wage that would otherwise prevail) reduces employment. While minimum wages may have desirable effects on income distribution by raising the wages of *employed* low-wage workers, these effects may be offset by reductions in the number of such workers who are employed. These reductions in employment are important for several reasons, including increased burden on the unemployment compensation system and decreased opportunities for on-the-job training that may eventually lead to higher-wage jobs.

The predicted disemployment effect of minimum wages has spurred widespread debate about the merits of minimum wage laws, along with numerous efforts to evaluate empirically their economic effects. A remarkably comprehensive set of studies was assembled in 1981 by the Minimum Wage Study Commission. This Commission was formed by then-President Carter to advise the executive and legislative branches on the impact of the minimum wage. The consensus of the Commission's research, as well as numerous other studies in academic journals, is that the imposition of minimum wages decreases employment opportunities for workers with wages at or near the minimum wage.[1] More explicitly, surveys of empirical research suggest that a 10 percent increase in the minimum wage reduces teenage employment by 1 to 3 percent. Effects for 20- to 24-year-olds are somewhat smaller, since fewer of them earn relatively low wages.[2]

1. For example, a recent survey of 1,350 academic and non-academic economists revealed that only 20.5 percent disagreed with the statement that a minimum wage increases unemployment among young and unskilled workers (Alston, *et al.*, 1992).

2. Brown, *et al.*, 1982, and Brown, 1988. Economic research on minimum wages tends to focus on employment rates, *i.e.*, the ratio of employed persons to the population, rather than the more familiar unemployment rate. Economic models of minimum wage effects on unemployment rates are ambiguous (Mincer, 1976), because unemployment rates are defined relative to the labor force, rather than the population. The problem is that the number of people seeking work could fall in response to a minimum wage increase, if individuals believe their employment prospects have worsened. This could lead to a situation in which a minimum wage increase reduces the unemployment rate.

Recent research using new data sets has again focused on the effect of minimum wage laws on employment. Two of these studies[3] challenge the "conventional wisdom" that minimum wages reduce employment of young workers while a third study supports the traditional finding of employment losses.[4] This new research also addresses the impact of subminimum wages, such as the 85 percent "training" wage enacted as part of the most recent federal minimum wage legislation.[5]

The consensus of this research, plus numerous other studies in academic journals, is that the imposition of minimum wages decreases employment opportunities for workers with wages at or near the minimum wage.

This paper reviews the evidence presented in Neumark and Wascher that bears directly on the conflicting findings in this new research on minimum wages, and explains how this research supports conclusions that are consistent with the textbook model of minimum wage effects: that minimum wages lead to reductions in employment of young workers; and that subminimum wages moderate these reductions.

Recent Research on Minimum Wage Effects on Employment

An important shortcoming of previous research on minimum wages is that it was based almost exclusively on "time-series" data. This is aggregate data for the entire U.S. economy; it relies only on the *federal* minimum wage and workers who are covered by that wage. The authors of time-series minimum wage studies often recognized the inadequacy of their data for empirical analysis of minimum wage effects.[6]

3. David Card, "Using Regional Variation in Wages to Measure the Effects of the Federal Minimum Wage," *Industrial and Labor Relations Review*, Volume 46, Number 1 (October 1992), pp. 22-37; and David Card, "Do Minimum Wages Reduce Employment? A Case Study of California, 1987-1989," *Industrial and Labor Relations Review*, Volume 46, Number 1 (October 1992), pp. 38-54; (October 1992), pp. 6-21.
4. David Neumark and William Wascher, "Employment Effects of Minimum and Subminimum Wages: Panel Data on State Minimum Wage Laws," *Industrial and Labor Relations Review*, Volume 46, Number 1 (October 1992), pp. 55-81.
5. Lawrence F. Katz and Alan B. Krueger, "The Effect of the Minimum Wage on the Fast-Food Industry," *Industrial and Labor Relations Review*, Volume 46, Number 1
6. Wachter and Kim, 1978.

There were two major problems with this data. First, there have been relatively few changes in the federal minimum wage level with which to conduct statistical "experiments" which would measure the effects of minimum wages on employment. Second, those changes in federal minimum wages that did occur were sometimes contemporaneous with other changes in labor markets, such as the expansion of job programs, which made it difficult to separate the independent effects of the minimum wage increase from the effects of other economic forces.

These shortcomings of existing research motivated the recent research on minimum wages, which uses alternative data sources to estimate minimum wage effects. Some of these recent studies have reached conclusions that diverge from earlier research, and hence have called into question the standard view that minimum wages reduce employment, even if by only small amounts.

One weakness of the Katz and Krueger study and the second Card study is that they relate to a single change in the minimum wage...In contrast, Neumark and Wascher use a national data set over a period of about 15 years.

In his first study, Card[7] compares the employment experiences of California workers during the late 1980s, when the state minimum wage level rose sharply, with the experiences of similar workers in labor markets which had no change in minimum wage laws. He finds no evidence of a disemployment effect from the higher minimum wage. In a second study, Card[8] draws a similar conclusion from a data set covering all 50 states for 1989 and 1990. Katz and Krueger,[9] in a survey of Texas fast-food restaurants that remained in business, found no evidence of declines in employment in response to the 1990 increase in the federal minimum wage.

One weakness of the Katz and Krueger study and the second Card study is that they relate to a single change in the minimum wage. Since one of the major criticisms of past time-series work on minimum wages was that it relied on relatively few observations on minimum

7. 1992a.
8. 1992b.
9. *op. cit.*

wage changes, it seems inappropriate to interpret these recent findings as necessarily more compelling than past time-series work.

In contrast, Neumark and Wascher[10] use a national data set over a period of about 15 years. This data set can be thought of as the combination of time-series data on each of the states; it is referred to as a "panel" data set.[11] This study found that a 10 percent increase in the minimum wage reduces employment of young workers from 1 to 2 percent, contradicting both the Card and Katz and Krueger studies.[12]

Neumark and Wascher conclude that studies which indicate that increases in the minimum wage reduce employment by 1 to 2 percent for every 10 percent increase in the minimum wage, are accurate.

These conflicting estimates create some uncertainty as to whether or not minimum wages actually reduce the employment of teenagers or young adults. The results for Texas fast-food restaurants, and for California in 1987-1989, pertain to specific labor markets, and are therefore somewhat difficult to contrast with the results in Neumark and Wascher. The contrast between the second Card study and the Neumark and Wascher research is more troubling, however, since these papers use data that are quite similar, except that Card's data cover a different and shorter time period.

Both of these studies exploit information on geographic differences in the minimum wage, which arise because individual states often legislate changes in state minimum wages. States cannot impose a minimum wage lower than the federal minimum for covered employees, but many states have a minimum wage above the federal level, or extend coverage to workers excluded from federal legislation. The variation in state minimum wage levels, coupled with the interaction of these minimum wage levels with "average" wage levels that vary across states, provide what is probably a better experiment for estimating minimum wage effects than the data used in earlier time-series studies.

10. *op. cit.*
11. The data sets used by Card are also panel data sets, although of much shorter length.
12. Economists summarize such measures in terms of elasticities, which measure the ratios of percent changes in employment rates in response to percent changes in minimum wages; thus, this result can be stated as the estimated elasticities range from -0.1 to -0.2.

Neumark and Wascher conclude that studies which indicate that increases in the minimum wage reduce employment by 1 to 2 percent for every 10 percent increase in the minimum wage, are accurate.

Using an estimation method similar to the one relied on by Card in his second study, Neumark and Wascher are able to replicate Card's results with their data. Thus, the differences in the conclusions between the two papers are not attributable to differences in the sample period. However, they argue that the estimation method that replicates Card's results is flawed. The estimating equation used by the Card study omits the school enrollment status of individuals, a misspecification which introduces a bias that generates low estimates for the minimum wage effect. More importantly, Neumark and Wascher show that there is strong evidence that minimum wages have lagged effects; that is, it takes more than a year for minimum wage increases to have their full effects on employment. Therefore estimates based on the relationship between minimum wages and employment within a year understate the disemployment effect of minimum wages.

Card did not take account of these lagged effects. By ignoring lagged effects, Card's estimation method has a particularly strong tendency to produce estimates falsely indicating that minimum wages do not reduce employment, and perhaps even indicating that they increase employment.

Card did not take account of these lagged effects. By ignoring lagged effects, Card's estimation method has a particularly strong tendency to produce estimates falsely indicating that minimum wages do not reduce employment, and perhaps even indicating that they increase employment.[13] As evidence that this problem underlies the differences in results, Neumark and Wascher show that once these lags are taken into account, alternative estimation methods all suggest that minimum wages do, in fact, reduce employment of teens and young adults.[14]

13. In statistical language, his method produces upward "biased" estimates of the effect of minimum wages on employment. If the true effect is negative, this bias results in estimated disemployment effects that are too small, or perhaps even of the wrong sign.
14. The technical aspects of this discussion can be found in Appendix A.

Recent Research on Subminimum Wages

The second topic that has attracted attention in recent research on minimum wages is the potential for youth or student subminimum wage provisions to moderate the disemployment effects of minimum wages. Because many states have had such subminimums in the past, augmenting the state-level panel data set with information on state subminimum wage provisions provides a way to estimate the impact of these subminimums. Generally, subminimum wage provisions enacted by state legislatures in the past have taken two forms: (1) a subminimum (or exemption) based on age, or (2) one based on student or apprentice (learner) classification.[15]

The most important question is whether subminimum wages moderate the disemployment effects of standard minimum wages. Krueger and Katz do not address this question. In fact they cannot do so...

Katz and Krueger[16] have attempted to assess the likely impact of the new federal subminimum by surveying fast-food restaurants in Texas about their use of the subminimum. Their survey was conducted immediately following the implementation of the new federal legislation, with a follow-up eight months later. They find that relatively few (less than 5 percent) of the restaurants in their sample used the new federal subminimum wage, even though most of these restaurants paid a starting wage below the new federal minimum before it went into effect. This finding is rather striking. It is, however, specific to a narrowly defined labor market.

The most important question is whether subminimum wages moderate the disemployment effects of standard minimum wages. Katz and Krueger do not address this question. In fact they cannot do so, because they only study a one-time increase in the minimum wage level for a sample of employers who are covered by the same (federal) subminimum wage provision. Admittedly, though, if only a handful of employers use subminimum wages, they are unlikely to have much impact.

15. Past legislation sometimes permitted some classes of employers (primarily colleges and universities) to pay subminimum wages to full-time students, but had never before been generalized to all young or new workers. See Freeman, *et al.* (1981) and Brown, *et al.* (1983).
16. *op. cit.*

Individual states have sometimes implemented exemptions from state minimum wage levels for specific subgroups of the labor force, such as teenagers, apprentices, or students. Neumark and Wascher exploit these state-level differences.[17] By including this information in their panel data set, they are able to evaluate directly the extent to which subminimum wages moderate the disemployment effects of minimum wages.

This research has an advantage over Katz and Krueger's study in that it studies minimum wage effects on all young workers, not only those confined to a single industry in a single state...

This research has advantage over Katz and Krueger's study in that it studies minimum wage effects on *all* young workers, not only those confined to a single industry in a single state. Neumark and Wascher did find evidence that state subminimum wage provisions are utilized by employers. More importantly, they found that youth subminimum wages substantially moderate the disemployment effects of minimum wages for teenagers. In particular, they examine the likely impact of an 85 percent youth subminimum, which would be equal to the federal subminimum wage. They estimate that such a subminimum would reduce the disemployment effect of minimum wages by between one-third and one-half.[18]

More importantly, they found that youth subminimum wages substantially moderate the disemployment effects of minimum wages for teenagers.

CONCLUSION

Using a specially constructed panel data set on state minimum wage laws and labor market conditions, Neumark and Wascher present new evidence on the effects of minimum wages on the employment of teenagers and young adults, and assess the extent to which youth or student subminimum wages reduce the adverse disemployment effects of minimum wages.

17. *op. cit.*
18. The technical aspects of this discussion can be found in Appendix B.

A re-examination of the existing evidence provides a range of estimated effects of minimum wages on employment-to-population ratios. Based on the evidence, the best estimate of the range of effects is that a 10 percent increase in the minimum wage reduces employment of teenagers by 1 to 2 percent, with the effect generally closer to 2 percent for specifications

Based on the evidence, the best estimate of the range of effects is that a 10 percent increase in the minimum wage reduces employment of teenagers by 1 to 2 percent...

taking account of school enrollment rates. For young adults, the best estimate of the range of effects is from 1.5 to 2 percent. In general, these results are consistent with negative effects suggested by earlier time-series studies.

The results in Card's research appear to conflict directly with Neumark and Wascher's findings, despite the fact that these results come from similar statistical experiments for similar units of observation. In fact, the results do not differ in a statistically significant way for the one specification that appears in all of the papers: teenage employment equations that do not control for school enrollment rates. However, it was argued that this model is misspecified by

...the evidence from correctly-specified models points to consistently negative effects of minimum wages on employment...

the exclusion of the school enrollment rate. Moreover, Neumark and Wascher show that the failure to consider lagged effects of minimum wages, especially in the short first-difference estimators used by Card, leads to estimated effects of minimum wages on employment that are too close to zero, and frequently positive. For the other specifications that they estimate (including school enrollment rates in the equation for teenagers, and both specifications for young adults), the evidence from correctly-specified models points to consistently negative effects of minimum wages on employment, with negative long-run effects in the ranges reported above.

Based on the preferred specifications resulting from this analysis, Neumark and Wascher also provide what are apparently the first estimates of the role of youth or student subminimum wages in mitigating the disemployment effects of minimum wages on teenagers. The results are consistent with a true effect of subminimum wages, indicating that youth subminimums (but not *student* subminimums), eliminate between one-third and one-half of the disemployment effects of minimum wages on teenagers.

APPENDIX A

METHODOLOGY AND FINDINGS FROM THE NEUMARK-WASCHER ESTIMATION

Reconsidering the Existing Evidence

The typical time-series study of minimum wage effects estimates a regression equation of the form:

(1) $E_t = \alpha_0 + \alpha_1 MW_t + X_t\beta + \epsilon_t$

E_t is the employment-to-population ratio for the age group under study. X_t is a set of variables capturing aggregate business-cycle effects, the changing age structure of the population, and in some specifications, school enrollment rates. The "t" subscripts on the variables indicate the years or quarters that the data describe.

MW_t is the critical variable. It is typically referred to as the "coverage-adjusted relative minimum wage." Because the minimum wage is fixed in nominal terms, its effects should depend on how large it is relative to the average wage. In addition, not all workers are covered by the minimum wage (that is, the legislation does not apply to all workers), and it should affect employment more when a higher fraction of workers is covered. Consequently, the minimum wage variable used in most studies is constructed as the minimum wage level, multiplied by the proportion of workers covered by minimum wage legislation, all divided by the average wage. Existing evidence on minimum wage effects estimated from specifications like equation (1) indicate that 10 percent increases in minimum wages reduce employment from 1 to 3 percent for teenagers aged 16-19, with somewhat smaller effects for 20-to-24 year-olds (Brown, et al., 1982, and Brown, 1988).

In contrast, Neumark and Wascher construct a panel data set on state minimum wage laws and state-level economic conditions.[19] While these data offer advantages compared with the time-series data used in previous research, the use of panel data also addresses an important criticism leveled at the small number of previous studies that used single "cross-sections" of data (that is, data on all of the states, but only for a single year), studies that were conducted in part to address some of the problems with time-series analyses of minimum wage effects. In most of these studies (Katz, 1973; Freeman, 1982; Cotterill and Wadycki, 1976; Welch and Cunningham, 1978), much of the variation in the coverage-adjusted relative minimum wage arose from variation in average wage levels across states, leading critics to argue that the estimated wage effects largely reflected state "average wage" effects rather than minimum wage differences (Brown, et al., 1982). In other words, there might be variation in state economic conditions that give rise to persistently tight labor markets and high average wages (or vice versa) in particular states (Freeman, 1982). In a cross-sectional version of equation (1) — where the t subscript indicates states instead of years — this would generate a negative relationship between MW_t (which has the average wage in the denominator) and E_t, and hence an estimate

19. The data set is described in Appendix C.

of the disemployment effect that is too large; to use a phrase that will be repeated often in this paper, the estimated minimum wage effect in a single cross-section regression may be "biased" towards finding a large negative effect of minimum wages on employment. In contrast, the use of panel data permits explicit estimation of state (or year) effects as distinct from the effects of changes in the minimum wage variable, and so permits unbiased estimation of minimum wage effects.[20]

Specifically, the panel data set permits estimation of an equation of the form

$$(2)\ E_{it} = \alpha_0 + \alpha_1 MW_{it} + X_{it}\beta + Y_t\gamma + S_i\delta + \epsilon_{it}$$

where i indexes states and t indexes years. Y_t is a set of fixed year effects (year dummy variables), and S_i is a set of fixed state effects (state dummy variables).

It is important to point out that Card's work (1992b) is concerned with exactly the same problems: the bias toward finding a large negative effect of minimum wages on employment in cross-sectional estimates of minimum wage effects; and the inadequacy of previous time-series estimates. Reflecting this, his general approach to estimating minimum wage effects is similar to that of Neumark and Wascher, although he uses different data and different estimators and equation specifications. The differences between Card's results and those obtained by Neumark and Wascher hinge instead on some technical econometric points. To understand these points, estimation of equation (2) must first be explained.

In principle, equation (2) can be estimated by defining a dummy variable for each state that is equal to one when the observation is for that state, and zero otherwise.[21] This is called the "within-group" estimator. In practice, the *identical* estimator is obtained by transforming each variable in equation (2) by subtracting off of each variable the mean of that variable over the whole sample period, for the state for which the observation is drawn. Thus, for example, the minimum wage variable for California for 1979 is transformed into the value of this variable, minus the mean of the minimum wage variable for California over the years 1973-1989.

To obtain baseline estimates of minimum wage effects, and to illustrate the importance of including state and year effects, Table 1 reports alternative estimates of equation (2). In each case the estimated effect on the employment-to-population ratio of a 10 percent increase in the minimum wage is reported.[22] The asterisks denote the statistical significance of the estimate of

20. Only three studies for the United States (Cunningham, 1981; Cogan, 1981; and Lester, 1946) and one for Canada (Swidlinsky, 1980) use repeated observation on states to remove the influence of state effects on cross-sectional estimates. Swidlinsky's approach is most similar to that in this paper, using data for five regions over a twenty-year period. He reports an employment elasticity of -0.17 for Canadian teenagers, consistent with the estimates found in Neumark and Wascher.

21. To keep the discussion simple, it is assumed that the year effects are captured by including year dummy variables.

22. This is based on the estimate of the elasticity of the employment rate with respect to the minimum wage, evaluated at the sample means. The elasticity is computed as the estimate of α_1 from equation (2), multiplied by the ratio (at the means) of MW to E.

the minimum wage effect α_1. Panel A reports specifications with different combinations of fixed state and year effects for teenagers (16-19), while Panel B repeats the same analysis for young adults (16-24). In all cases, the within-group estimator is used to estimate fixed-effects models.

Column 1 reports estimates when no fixed state or year effects are included. For both age groups, whether or not the enrollment rate is included, the estimated minimum wage effects are negative and statistically significant, and imply that a 10 percent increase in the minimum wage reduces employment by .9 to 1.8 percentage points.

However, as discussed above, omitting fixed state effects may lead to overly strong estimates of disemployment effects. This is suggested by the estimates in column 2, in which state effects are added. In the specifications excluding the school enrollment rate, the estimated minimum wage effect is positive and statistically significant for teenagers, and positive but statistically insignificant for young adults. In the specifications including the school enrollment rate, the disemployment effects are negative and statistically significant for both teenagers and young adults, although the estimated disemployment effects are smaller than indicated by the estimates omitting fixed state effects, in column 1. Finally, in column 3, fixed year effects are added as well. This leads to negative estimated effects of minimum wages on employment in three of the four specifications.

TABLE I

Percent Change in Employment to Population Ratios From a Ten Percent Increase in the Minimum Wage. "Within Group" Estimates

	No State or Year Effects (1)	State Effects (2)	State and Year Effects (3)
A. Teenagers (16-19)			
Enrollment Rate Excluded:	-1.4†	1.7†	0.6
Enrollment Rate Included:	-1.8†	-0.9†	-1.4†
B. Young Adults (20-24)			
Enrollment Rate Excluded:	-0.9†	0.1	-0.7
Enrollment Rate Included:	-1.3	-0.7†	-1.0†

* Statistically significant at the 10 percent level.
† Statistically significant at the 5 percent level.
Source: Neumark and Wascher (1992)

However, only in the specifications including the enrollment rate are these negative effects statistically significant. The minimum wage effects in column 3 estimated from the models that include the school enrollment variable are broadly consistent with earlier time-series evidence of negative employment effects of minimum wages. However, the positive estimated minimum wage effect for teenagers from the model that excludes the school enrollment rate is unusual. It should be pointed out, though, that Card (1992b) also excludes the enrollment rate, and fails to find negative minimum wage effects. One critical question, then, is whether the school enrollment rate should be included in these employment equations. The argument for including school enrollment is that variation in enrollment rates may affect employment rates, independently of the effects of minimum wages. If this is the case, and if, in addition, enrollment rates and minimum wages are correlated, then omitting the enrollment rate from equation (2) can lead to incorrect (or biased) estimates of minimum wage effects on employment. This may occur because changes in employment rates due to changes in enrollment rates may be incorrectly attributed to minimum wage effects. In particular, excluding the enrollment rate results in estimated minimum wage effects that are biased upward, *i.e.*, against a finding that minimum wages reduce employment.[23]

On the other hand, simply including the school enrollment rate in equation (2) may also lead to incorrect estimates of minimum wage effects if employment rates and enrollment rates are jointly determined; in particular, the estimated disemployment effect of minimum wages may be too strong. Because school and work represent alternative opportunities for many young persons, factors that affect employment rates (such as changes in minimum wages) may affect enrollment rates as well, and vice versa. For example, some factor that increases employment (such as high labor demand) should also reduce enrollment rates. This leads to an overly negative estimate of the coefficient of the school enrollment variable in the employment equation. If the relationship between enrollment rates and minimum wages is negative (as it is in Neumark and Wascher's data), this in turn leads to an overly negative estimate of the effect of minimum wages on employment.[24]

Neumark and Wascher (1992) argue that the bias, or mismeasurement, of the effect of minimum wages on employment from omitting the school enrollment rate is more severe than that from including the enrollment rate. We might expect minimum wage effects, if they are present, to be stronger for teenagers than for young adults, since more teenagers earn wages near the minimum. This expectation is confirmed only in the specifications including the enrollment rate; in the specifications excluding the enrollment rate, the estimated employment effects are negative only for young adults. The same general result appears in later tables; in specifications excluding the school enrollment rate, minimum wage effects are weaker (although often negative) for teenagers than for young adults, while the reverse holds for specifications including the enrollment rate. This suggests that the equations excluding the enrollment rate are badly misspecified. Furthermore, Neumark and Wascher argue that the bias from including the

23. This is because the partial correlation between the minimum wage variable and the enrollment rate is negative.
24. One potential solution is to include the school enrollment rate and instrument for it. However, this requires a valid instrumental variable.

enrollment rate — despite its possible joint determination with employment — is minor.[25] Based on this conclusion, the appropriate estimates of equation (2) in Table I (those in the second and fourth rows of column 3) imply that a 10 percent increase in the minimum wage reduces teenage employment by 1.4 percent, and employment of young adults by 1 percent.

Reconciling Conflicting Evidence in Recent Research on Minimum Wage Effects

The findings of significant negative effects of minimum wages on employment of teens and young adults contrast with conclusions drawn by Card, in his study of the rise in California's minimum wage between 1987 and 1989 (Card, 1992a), and his study of the increase in the federal minimum wage in 1990 (Card, 1992b). In both cases, he fails to find negative effects of minimum wages on teen employment. This result is particularly troubling in the paper studying the 1990 increase in the federal minimum (1992b), because the analysis parallels that in Neumark and Wascher quite closely. There are three principle differences between the estimates reported in Table I, and Card's (1992b) estimates. First, Card does not include the enrollment rate as a control variable. As noted in Table I, this leads to less negative (or more positive) estimates of the effects of minimum wages on employment. As discussed above, however, it seems that the enrollment rate should in fact be included. Second, the sample used in Card (1992b) differs from that used in this paper; Card's data cover the 50 states and Washington, D.C., as does this paper, but only over the period 1989-1990. Third, given that he has only two years of data, Card uses the "first-difference" estimator of equation (2). It is this latter point that turns out to be critical, although some technical discussion is necessary to set the stage.

"Within-group" estimation of equation (2) was explained above. An alternative estimation method is to form first differences of each variable in equation (2) — that is, the value of each variable at time t, minus its value at $t-1$ — and then to estimate the equation (as a standard regression) for these differences. Because the state effects S_i are fixed over time, they drop out of this differenced equation, and the bias from the fixed state effects should be eliminated. With only two years of data, the "first-difference" and "within-group" estimates are numerically identical. However, with more than two years of data they are not identical,

25. The potential endogeneity bias (*i.e.*, the bias from the joint determination of employment and enrollment rates) from including the enrollment rate arises from an auxiliary equation in which the enrollment rate is a function of, among other variables, the employment rate. Factors that increase the employment rate through ϵ_{it} in equation (2) then reduce the enrollment rate in the auxiliary equation, leading to an overly strong negative estimated correlation between employment and enrollment rates in equation (2). Presumably, one important factor that shifts the employment rate is the level of economic activity. If so, then we would expect the endogeneity bias in the coefficient of the enrollment rate, in equation (2), to be much more severe if the prime-age male unemployment rate were excluded from the equation. However, when the unemployment rate is excluded from the specifications shown in Table 1, the estimated coefficient of the enrollment rate was virtually the same as in the specifications including the unemployment rate. Because the inclusion of the unemployment rate should remove a significant portion of the endogeneity bias, these results suggest that endogeneity bias is relatively unimportant.

although, in principle, they should be relatively close; in general, then, both estimators are equally valid.[26]

However, Neumark and Wascher show that for their data, for which they have more than two years of data, the first-difference and within-group estimators yield strikingly different results. This turns out to be very important in reconciling conflicting evidence on minimum wage effects in recent research, because Card (1992b), having only two years of data, presents only first-difference estimates. In fact, Card uses the first-difference estimator in both of the papers in which he fails to find negative minimum wage effects. Thus, the problems with his first-difference estimates, emphasized in Neumark and Wascher, may apply equally well to both papers. But because the 1992b paper is more directly comparable to the analysis in Neumark and Wascher, the discussion of the conflicting findings that follows emphasizes this paper.

To show that using the first-difference estimator (when we have a choice, *i.e.*, when we have many years of data) affects the results, Table I reports first-difference estimates of the same models reported in column 3 of Table I. The estimated minimum wage effects are strikingly different from the within-group estimates reported in column 3 of Table I, and are similar to the results reported by Card. In particular, in three of the four specifications there is a positive (although statistically insignificant) effect of minimum wages on the employment-to-population ratio, and there is clearly no statistically significant evidence of negative effects of minimum wages on employment.

TABLE II

Percent Change in Employment to Population Ratios From a Ten Percent Increase in the Minimum Wage. "First Difference Estimates"	
A. Teenagers (16-19)	
Enrollment Rate Excluded:	-1.4†
Enrollment Rate Included:	-1.8†
B. Young Adults (20-24)	
Enrollment Rate Excluded:	-0.9†
Enrollment Rate Included:	-1.3

* Statistically significant at the 10 percent level.
† Statistically significant at the 5 percent level.
Source: Neumark and Wascher (1992)

Thus, a principal source of differences between Card's results and those reported in Table I is whether equation (2) is estimated using the within-group estimator, as in Table I, or instead using a short first-difference estimator, as in Card's papers and in Table I. Because both estimators of equation (2) should be consistent, the differences in the results apparently arise because of some model misspecification.

Above, it was asserted that at least in principle the within-group and first-difference estimates of equation (2) should be close. Why, then, are they in fact so different? Is this just a statistical fluke, or is it indicative of some other problem that, once resolved, may lead to an unambiguous answer? One reason why the within-group and short first-difference estimates can differ is that the model in equation (2) is misspecified by ignoring lags in the effects of minimum

26. In statistical parlance, they are both unbiased.

wage changes. That is, the effects of minimum wages on employment may take some time to evolve. Brown, *et al.* (1982), discuss the arguments for and against the likely existence of significant lags in minimum wage effects.

Lagged effects may arise because of hiring and training costs, or an inability to adjust other productive inputs quickly. But strong lags in minimum wage effects are sometimes considered less likely because of high turnover among low-wage workers, and because minimum wage changes are typically enacted some time before they actually take effect. It is noteworthy, however, that Card (1992b) reports empirical evidence consistent with a lag between legislated increases in minimum wages and upward wage adjustments by employers. Clearly if these upward wage adjustments take some time to occur following increases in legislated minimum wage levels, then we may find evidence of lagged effects of legislated minimum wage increases on employment.

If equation (2) is misspecified by omitting lags, then the first-difference estimator is likely to underestimate the negative effect of minimum wages on employment, and perhaps even to generate a positive estimate of this effect. In contrast, the within-group estimate is likely to be little biased, although it may also understate the negative effect of minimum wages on employment.[27] Thus, the omission of lags from equation (2) could explain the discrepancies between the estimated minimum wage effects in Tables I and II, and therefore explain why Card does not find negative minimum wage effects. If the bias from omitting lagged effects does underlie these discrepancies, then adding lagged values of the minimum wage should have two consequences. First, the within-group and first-difference estimates of the effects of minimum wages on employment should be quite close. And second, both sets of estimates should be somewhat stronger (more negative) than the estimates obtained from equation (2).

To test whether this explanation of the discrepancies is correct, Table III reports both within-group and first-difference estimates of minimum wage effects, from the equation

---

27. The reasoning is straightforward, although it requires some technical discussion. Rewrite equation (2) to include a lagged minimum wage effect:

$$E_{it} = \alpha_0 + \alpha_1 MW_{it} + \alpha_2 MW_{it-1} + X_{it}\beta + Y_t\gamma + S_i\delta + \epsilon_{it} .$$

In the first difference estimate of equation (2), the minimum wage variable is transformed by forming $MW_{it} - -W_{it-1}$. If, however, the true model should include lags, then the first differenced model should also contain $MW_{it-1} - MW_{it-2}$, i.e., the first difference of the lagged minimum wage. In the first-difference estimation of equation (2), however, the term $MW_{it-1} - MW_{it-2}$ is omitted. Clearly, however, the included variable $MW_{it} - MW_{it-1}$ is strongly negatively correlated with the omitted variable $MW_{it-1} - MW_{it-2}$, because MW_{it-1} appears with a negative sign in the first term, and a positive sign in the second. As long as α_2 is in fact negative (i.e., the lagged minimum wage effect on employment is negative), then first-difference estimation of equation (2) will result in an upward-biased estimate of α_1, perhaps even leading to a positive estimate of the effect of minimum wages on employment. In contrast, the bias in the within-group estimator (in a sample extending over many years) is much less severe. In the within-group estimator, instead of forming $MW_{it} - MW_{it-1}$, we form $MW_{it} - MW_i$, where MW_i is the mean of the minimum wage variable for all years for state i. The excluded minimum wage variable is then $MW_{it-1} - MW_i$. But the correlation between the included and excluded variable is in this case much weaker, since MW_{it-1} is only one of many observations used to estimate MW_i.

introducing a lagged minimum wage variable.[28] The estimates reported in Table III show that both of these consequences actually occur. First, the long-run or overall minimum wage effects implied by the within-group and first-difference estimates are quite close to each other. Second, the estimated effects are stronger (more negative) than implied by any of the estimates excluding lagged effects in Tables I or III.[29] In particular, if we focus on the estimates from equations including the enrollment rate, the estimates indicate that a 10 percent increase in the minimum wage reduces employment of teens by 1.5 to 1.9 percent, and reduces employment of all young adults by 1.7 to 1.9 percent.[30] These estimates are close to the midrange of the consensus of past time-series studies, and therefore confirm the view that minimum wages reduce employment.

TABLE III

Percent Change in Employment to Population Ratios From a Ten Percent Increase in the Minimum Wage. Specification Allowing Lagged Effects of Minimum Wages.

	Within Group	First Difference
A. Teenagers (16-19)		
Enrollment Rate Excluded:	-0.3	-1.2
Enrollment Rate Included:	-1.9†	-1.5
B. Young Adults (20-24)		
Enrollment Rate Excluded:	-1.8†	-1.7
Enrollment Rate Included:	-1.7†	-1.9*

* Statistically significant at the 10 percent level.
† Statistically significant at the 5 percent level.
Source: Neumark and Wascher (1992)

28. The estimates reported in the table are based on long-run elasticities computed from the coefficients of the contemporaneous and lagged minimum wage variables.
29. In estimates not reported in the table, the biases that would be expected from the omission of a lagged minimum wage variable are revealed. For all of the first-difference estimates reported in Table 3, the estimate of α_1 (the coefficient on the contemporaneous minimum wage variable) was less positive or more negative than the estimates reported in Table 2. Moreover, the coefficient of the lagged minimum wage variable (α_2) was statistically significant or marginally so is seven of the eight specifications for which estimates are reported in Table 3, and in all eight cases the coefficient on the lagged minimum wage variable is more negative than that on the contemporaneous minimum wage variable.
30. These results held up when a two-year lag of the minimum wage variable was added to the equation, and when one-year lags of all of the right-hand-side variables were included.

SUMMARY

Much of the source of the differences between Card's results and those of Neumark and Wascher is that minimum wages have lagged effects; that is, they take more than a year to have their full effects on employment. Card did not take account of these lagged effects, but when lagged effects are ignored, the estimation method that he uses has a particularly strong tendency to produce estimates indicating that minimum wages do not reduce employment, and may even indicate that they increase employment. Neumark and Wascher show that once these lags are taken into account, alternative estimation methods all suggest that minimum wages do, in fact, reduce employment of teens and young adults.

APPENDIX B

EVIDENCE ON STUDENT AND YOUTH SUBMINIMUM WAGE PROVISIONS

Neumark and Wascher (1992) study the effects of subminimum wages by estimating an equation of the form

$$(3) \quad E_{it} = \alpha_0 + \alpha_1 MW_{it-1} + \alpha_2 SUB_{it-1} \cdot (MW_{it-1} - SMW_{it-1}) + X_{it}\beta + S_t\delta + \epsilon_{it} \ .$$

In this equation SUB is a dummy variable indicating the existence of either a youth or student subminimum wage, and SMW is the subminimum wage level. In equation (3) only lagged values of minimum and subminimum wage variables are included, since lagged effects are stronger than contemporaneous effects. The results that follow, though, were unchanged by including contemporaneous as well as lagged effects.

This equation can be interpreted as follows. α_1 measures the standard effect of minimum wages on employment. When a state has a subminimum, however, the term involving α_2 also plays a role, because for such a state SUB = 1 (instead of 0). The variable $(MW_{it-1} - SMW_{it-1})$ measures the amount by which the subminimum wage provision permits the employer to pay a wage below the minimum wage level. If subminimum wages moderate the disemployment effects of minimum wages, α_2 should be positive. Then the combined effect of a minimum wage is the employment-reducing effect α_1, and the employment-increasing effect α_2.

The results for estimates of this equation are reported in terms of the following example. Consider a state with its minimum wage level set at the current federal level of $4.25 per hour, with full coverage. For this state, the full disemployment effect from the state minimum wage is proportional to $(\alpha_1 \times 4.25)$. (The actual effect is obtained by dividing this expression by the average wage.) Suppose there is an 85 percent youth subminimum — paralleling the federal subminimum — allowing an employer to pay $3.61. With this youth subminimum, the disemployment effect of the minimum wage is proportional to $(\alpha_1 \times 4.25) + (\alpha_2 \times 0.64)$, where 0.64 is the reduction in the minimum wage allowed by the subminimum wage provision. If α_2 is positive, and α_1 is negative, then the subminimum moderates the disemployment effect of minimum wages.

Table IV reports the percentage reduction in the disemployment effect of the $4.25 minimum wage attributable to the 85 percent subminimum, based on the estimates of equation (3). For example, for the results reported in the first row of column 2, the estimate of α_1 is -.14, and the estimate of α_2 is .48. Thus, the subminimum wage leads to a 51.6 percent reduction in the disemployment effect of the minimum wage.[31]

31. This is computed as $(\alpha_2 \times 0.64)/(\alpha_1 \times 4.25)$. It should be pointed out, though, that interpreted another way, the estimate of α_2 seems a bit large. Consider, for example, the increase in the minimum wage from $3.35 to $4.25, with the simultaneous implementation of a $3.61 subminimum wage. In this case, the estimates imply that the subminimum wage more than offsets the disemployment effect of the minimum wage increase. This seems unlikely, although it could occur if employers substitute teenagers who are subject to the subminimum for older

Results for teenagers, to whom these subminimum wage provisions are most likely to apply, are reported in Panel A of Table IV. Results are reported for student/apprentice subminimums,[32] for youth subminimums, and for any subminimum (*i.e.*, the presence of either or both types of subminimum). Neither estimate in column 1 provides statistically significant evidence that student/apprentice subminimum wage provisions moderate the disemployment effects of minimum wages. However, when information on youth subminimums is incorporated, in columns 2 and 3, there is statistically significant evidence that state youth subminimum wage provisions moderate the disemployment effects for teenagers.[33,34]

Given that Katz and Krueger have provided evidence from another data source suggesting that employers make little use of subminimum wage provisions, it is important to question the validity of the results in Table IV. One possibility is that the estimated subminimum wage effects reflect other factors with which the subminimum wage variables are related. For example, subminimum wage provisions could coincide with relatively high employment in particular states, perhaps because states with subminimum wage

TABLE IV

Percentage Reduction of the Disemployment Effect of a $4.25 Minimum Wage From implementing an 85 percent ($3.61) Subminimum Wage "Within Group Estimates"

	Student/ Apprentice Subminimum	Youth Subminimum	Any Subminimum
A. Teenagers (16-19)			
Enrollment Rate Excluded	-26.8	51.6	60.2†
Enrollment Rate Included	10.6	31.6†	33.1†
B. Young Adults (20-24)			
Enrollment Rate Excluded		4.4	
Enrollment Rate Included		-16.5	

* Statistically significant at the 10 percent level.
† Statistically significant at the 5 percent level.
Source: Neumark and Wascher (1992)
Estimates are based on a minimum wage of $4.25

workers who are not.

32. It is generally difficult to distinguish between student and apprentice subminimums from the state laws.

33. One reason for the absence of significant effects for student subminimums could be that these subminimum wage provisions vary widely across states in terms of the students to whom they apply, with distinctions based on full-time or part-time student status, time of the year (whether school is in session), etc. In contrast, youth subminimum wage provisions are more uniform. In addition, student subminimums may apply to some young adults, reducing the ability to substitute teenagers exempted from the minimum wage, or leading to substitution between students and nonstudents within the teenage group, which would be masked in the employment rates for all teenagers.

34. In contrast to most of their analyses, in the construction of the subminimum wage gap Neumark and Wascher utilized information on state minimum wage coverage. To ignore state coverage would entail treating states with minimum wage levels at or below the federal minimum wage level identically, whether or not they had subminimum wage provisions. That is, the subminimum wage effect would be identified solely from the high minimum wage states. This model misspecification seems worth avoiding, despite the measurement error in state coverage. For purposes of comparison, the results in Table 4 were computed using only federal coverage. This resulted in insignificant coefficients for the subminimum wage variables; p-values for the significance of the youth or "any" subminimum wage variables were concentrated in the range from 0.2 to 0.4.

provisions also have relatively lax enforcement of state minimum wage laws. To examine this question, Neumark and Wascher reestimated equation (3) only for individuals aged 20-24. Because youth subminimums typically apply to individuals aged 18 or less, if the youth subminimums boost employment of teenagers, they should have little effect on, and perhaps even reduce, the employment of those aged 20-24. On the other hand, if the findings reflect a spurious correlation between youth subminimums and employment rates (*i.e.*, an apparent relationship that does not truly reflect moderating effects of subminimum wages), a similar positive association for these older youths might be expected. Results for these estimates are reported in the bottom panel of Table IV. The point estimates of the effects of subminimum wages on the employment rates of 20-to-24 year-olds are near zero or negative, and are not statistically significant. This suggests that youth subminimums do in fact moderate the disemployment effects of minimum wages on teenagers. On the other hand, the results for young adults suggest partial substitution away from them and towards teenagers, which would imply that the moderation of overall disemployment effects is less than that for teenagers alone.

As a second means of studying the validity of the subminimum wage results, Neumark and Wascher examined wage distributions for teenagers, to see if there are spikes at the subminimum wage, but below the minimum wage level. This parallels the type of analysis carried out by Katz and Krueger to assess whether employers use subminimum wages; in this case, though, the focus is on state subminimum wage provisions. Information was extracted on wages from monthly Current Population Survey files for 1989, restricting attention to those states with legislated minimum wages above the federal minimum wage; in other states only workers exempted from federal coverage would be expected to be found at the subminimum. Among these states, there is no evidence of spikes at the subminimum for the high-wage states of New England, and Alaska, Hawaii, and California. But for the lowest wage states (among those with state subminimums exceeding the federal level) of Pennsylvania, Minnesota, and Washington, there is evidence of spikes at the subminimum wage. For Pennsylvania and Washington, the spikes are at $3.35. This is the effective state subminimum wage for these states, but it is also the federal minimum for that year. These spikes at $3.35 could reflect actual use of state subminimum wage provisions. But because the federal minimum is also $3.35 these spikes could alternatively reflect workers covered by federal but not state legislation (and for whom, therefore, the minimum wage is $3.35), or some fraction of employers ignoring state, but not federal, minimum wage laws. In this regard, the spike for Minnesota is particularly noteworthy. Minnesota's subminimum ($3.47) exceeds the federal minimum, and the spike appears at $3.47. This suggests that the spikes observed at state subminimum wages do in fact reflect use of state subminimums. This lends credence to the regression results in Table IV suggesting that youth subminimum wages moderate the disemployment effects of minimum wages.

SUMMARY

Regression estimates indicate that state subminimum wages for youths reduce the disemployment effects of minimum wages. Based on the estimates obtained by Neumark and Wascher, a subminimum that allows payment of 85 percent of the minimum wage — paralleling

the federal training wage — offsets between one-third and one-half of the negative effects of minimum wages on employment of teenagers.

APPENDIX C

THE STATE MINIMUM WAGE PANEL DATA SET

The panel data set on minimum wages, minimum wage coverage, and local economic conditions, includes annual observations covering the 50 states and the District of Columbia for the years 1977 through 1989, and extending back to 1973 for a subset of 22 larger states for which the Current Population Survey (CPS) identified state of residence from 1973-1976. Neumark and Wascher constructed a chronology of each state's minimum wage legislation using information from state labor departments, from the Bureau of National Affairs' Compensation Primer, and from Questor (1981). In most cases, these sources yielded a single value of the minimum wage level in effect during May for each state and year. For a few states, the state minimum wage level differed by occupation or labor force group, and additional steps were necessary to obtain a single value that best captured the effective state law. Where the varying levels clearly were subminimums for youths, students, newly covered workers, or very low-skilled occupations, the highest value at each point in time was used. In two other cases, the existence of multiple minimum wage levels was not automatically suggestive of a subminimum. In the District of Columbia there are nine separate minimum wage levels for different industries and occupations, as well as differing minimum wage levels for youths, students, and Job Training and Partnership Act (JTPA) workers. In this case, they used the weighted average of the minimum wage levels for adults across the nine categories, weighted by estimated employment in each category in each year. In Minnesota in recent years, the state minimum wage level for workers covered by the Federal law (FLSA) differed from the level for those covered only by state law; in this case, the state minimum for workers covered by the FLSA was used.

Table V provides some descriptive information on state minimum wages. Column 1 shows the states with legislated minimum wage levels above the federal level for each year in the sample. Throughout the 1970s and much of the 1980s, only a few states set a minimum wage above the federal level.[35] However, by 1989 the number of states with higher minimums had risen to 13.[36] Columns 2 and 3 report the federal minimum wage level for each year and the average percentage difference between the state and federal minimum wage level, for states with legislated minimum wage levels exceeding the federal level. Perhaps not surprisingly — given that states tended to raise their minimum wages when the federal minimum wage was stagnant — the average percentage differential is greatest when the number of states with minimums exceeding the federal minimum is largest, rising to a peak of 16 percent in 1989.

35. Legislation in both Connecticut (beginning in 1974) and Alaska (beginning in 1977) automatically keeps the state minimum wage above the federal level. In Alaska, a constant differential of 50 cents per hour is maintained. In Connecticut, the law through 1987 set the state minimum 1/2 percent above the federal level, resulting in a differential of just a few cents.

36. With the increase in the Federal minimum to $3.80 per hour in 1990 and $4.25 in 1991, the number of states with higher minimum levels has again dropped, to five in 1991.

TABLE V

State Minimum Wage Levels					
	States with Minimum Wages Above Federal Minimum Wage	Federal Minimum	Average % Difference Column (1) vs. Column (2)	Average Coverage Adjusted Relative Minimum	
				Col. (1) States	Col. (2) States
	(1)	(2)	(3)	(4)	(5)
1973	CA, CT, DC, MA, NJ, NY	1.60	15.7	.30	.31
1974	CT, DC	2.00	5.0	.29	.36
1975	CT, DC, NJ	2.10	7.3	.30	.35
1976	CT, DC, HI	2.30	5.2	.31	.36
1977	AK, CA, CT, DC, HI, NJ	2.30	10.7	.33	.35
1978	AK, CT, DC	2.65	8.1	.33	.38
1979	AK, CT, DC	2.90	6.4	.33	.38
1980	AK, CT, DC	3.10	6.0	.32	.38
1981	AK, CT, DC	3.35	6.5	.34	.38
1982	AK, CT, DC	3.35	7.9	.30	.35
1983	AK, CT, DC	3.35	9.9	.32	.34
1984	AK, CT, DC	3.35	9.9	.32	.33
1985	AK, CT, DC, ME	3.35	8.4	.35	.35
1986	AK, CT, DC, ME	3.35	9.2	.33	.34
1987	AK, CT, DC, MA, ME, NH, RI, VT	3.35	8.3	.34	.34
1988	AK, CT, DC, HI, MA, ME, MN, NH, RI, VT	3.35	11.6	.33	.33
1989	AK, CA, CT, DC, HI, MA, ME, MN, NH, PA, RI, VT, WA	3.35	16.5	.33	.32

Source: Bureau of National Affairs' *Compensation Primer*; information from state labor departments.

Comprehensive time-series information on coverage by state minimum wage laws was more difficult to assemble. For the federal law, the Department of Labor has published estimates of the number of wage and salary workers in each state by their coverage status under the minimum wage provisions of the FLSA for most years in our sample. For coverage by state laws (above and beyond FLSA coverage), data are available from the Department of Labor only for the years 1974, 1975, and 1977. Given the absence of information on changes in state coverage over the remainder of our sample period, only the FLSA coverage estimates for each state for the available years are used in most of the analysis. For years with no official estimates (1979-81), it was assumed that federal coverage on a state-by-state basis changed in proportion to the change in coverage for the United States as a whole. For the years after 1986 (the latest data available), it was assumed that coverage rates held steady at their 1986 level.

For each state-year observation, a coverage-adjusted minimum wage is computed as the product of the greater of the federal or state minimum wage, and federal coverage for the state. Then, the ratio of the coverage-adjusted minimum wage prevailing in May of each year to the state average hourly wage during the same month is calculated; this is the variable used in the statistical analysis.[37] Columns 4 and 5 of Table V provide more information on the role of state minimum wage laws in influencing effective minimum wages. These columns report the average coverage-adjusted relative minimum wage variable separately for states with minimum wage levels exceeding the federal level, and for states in which the federal minimum wage level is binding.

A comparison of columns 4 and 5 reveals that minimum wage levels higher than the federal minimum generally did not result in higher relative minimum wages; indeed, throughout most of the sample period, relative minimum wages were higher in states *without* minimum wage levels exceeding the federal level, reflecting the lower average market wage in those states. However, over the 1980s the average relative minimum wage in states in which the federal minimum wage is binding declines, and by the end of the sample period, the average relative minimum wage is roughly the same for both sets of states. Thus, when evaluated in terms of changes, the rising incidence of state minimum wage laws did boost relative minimum wages during the 1980s.

For data on state labor market conditions over the same period, the May files of the Current Population Survey (CPS) were used. Variables estimated from the CPS include: employment rates for teens (16-19) and young adults (aged 16-24); unemployment rates for prime-age (25-64) males; proportions of the population aged 16-19 or 16-24; and the proportions

37. Because state-specific wage rates are not published outside of manufacturing, the average state wages used are estimated as the mean usual hourly wage from the May Current Population Surveys (CPS). For all data computed from the CPS, persons under age 16, self-employed workers, unpaid family workers, and those indicating agricultural production or agricultural services as their current or most recent industry were deleted.

The ratio of the coverage-adjusted minimum wage to the average wage for the age group studied may be more informative as to how much the minimum wage cuts into the wage distribution. However, for many states the cell sizes from which we can compute mean wages for teenagers and young adults are quite small (especially after 1982, when wage information was elicited from only one-fourth of the sample). In addition, the average teen wage is heavily influenced by the minimum wage.

of individuals aged 16-19 or 16-24 enrolled in school. In all cases, the variables are calculated from the individual survey responses, aggregated to the state level using the CPS demographic weights.

The final data set consists of 751 observations. There are data for the 50 states and Washington, D.C., multiplied by the 13 years for which complete data are available, plus an additional four years of data for the 22 larger states identified in the CPS from 1973-1976.

For the equation used to estimate the effects of subminimum wages (equation (3)), the estimate of SMW_s was constructed in two steps. First, for workers covered by a state minimum wage law, but not the FLSA, a subminimum reduces the wage paid from the level of the state minimum for all workers down to the minimum allowable wage for youths or students. Information available on student and youth subminimum wage provisions suggests that, on average, these provisions permit wage payments equal to about 75 percent of the minimum wage for other workers. Consequently, for each observation Neumark and Wascher construct a variable equal to 25 percent of the state minimum wage level, multiplied by state (and not federal) coverage, and divided by the mean wage in the state. Second, in states with a minimum wage level above the federal level, a subminimum wage provision would reduce the wage paid to workers covered by the FLSA from the state minimum wage level to the greater of the federal level, or 75 percent of the state level. For these states they add a second term that is the smaller of 25 percent of the state level and the difference between the state and federal levels, all multiplied by federal coverage and divided by the mean wage in the state. Information on the prevalence of state subminimum wage provisions is summarized in Table VI.

TABLE VI

Proportions of States with Student/Apprentice and Youth Subminimums				
	States with Minimum Wages Above Federal Level		All States	
	Percent with Student/ Apprentice Subminimum Wage	Percent with Youth Subminimum Wage	Percent with Student/ Apprentice Subminimum Wage	Percent with Youth Subminimum Wage
	(1)	(2)	(3)	(4)
1973	.67	1.0	.55	.64
1974	1.0	1.0	.59	.59
1975	1.0	1.0	.59	.55
1976	1.0	.67	.59	.55
1977	.83	.83	.63	.51
1978	1.0	1.0	.65	.53
1979	1.0	1.0	.63	.55
1980	1.0	1.0	.63	.55
1981	1.0	1.0	.63	.55
1982	1.0	1.0	.59	.53
1983	1.0	1.0	.59	.53
1984	1.0	1.0	.59	.53
1985	1.0	.75	.59	.53
1986	.75	.75	.67	.53
1987	.88	.88	.67	.53
1988	.90	.80	.67	.53
1989	.92	.77	.67	.55

Source: Bureau of National Affairs' Compensation Primer; Questor (1981); information from state labor departments.

REFERENCES

Alston, Richard M., J. R. Kearl, and Michael B. Vaughan. 1992. "Is There a Consensus Among Economists in the 1990's?" *American Economic Review*, Volume 82, Number 2 (May), pp. 203-9.

Brown, Charles. 1988. "Minimum Wage Laws: Are They Overrated?" *The Journal of Economic Perspectives*, Volume 2, Number 3 (Summer), pp. 133-46.

Brown, Charles, Curtis Gilroy, and Andrew Kohen. 1983. "Time-Series Evidence of the Effect of the Minimum Wage on Youth Employment and Unemployment." *The Journal of Human Resources*, Volume 18, Number 1 (Winter), pp. 3-31.

_____. 1982. "The Effect of the Minimum Wage on Employment and Unemployment." *Journal of Economic Literature*, Volume XX (June), pp. 487-528.

Card, David. 1992a. "Do Minimum Wages Reduce Employment? A Case Study of California, 1987-1989." *Industrial and Labor Relations Review*, Volume 46, Number 1 (October 1992), pp. 38-54.

_____. 1992b. "Using Regional Variation in Wages to Measure the Effects of the Federal Minimum Wage." *Industrial and Labor Relations Review*, Volume 46, Number 1 (October 1992), pp. 22-37.

Cogan, John. 1981. "The Decline in Black Teenage Employment: 1950-1970." National Bureau of Economic Research Working Paper No. 683.

Cotterill, Philip G. and Walter J. Wadycki. 1976. "Teenagers and the Minimum Wage in Retail Trade." *Journal of Human Resources*, Volume 11, Number 1 (Winter), pp. 69-85.

Cunningham, James. 1981. "The Impact of Minimum Wages on Youth Employment, Hours of Work, and School Attendance: Cross-sectional Evidence from the 1960 and 1970 Censuses." In Simon Rottenberg, ed., *The Economics of Legal Minimum Wages*. Washington, D.C.: American Enterprise Institute, pp. 88-123.

Freeman, Richard B. 1982. "Economic Determinants of Geographic and Individual Variation in the Labor Market Position of Young Persons." In Richard B. Freeman and David A. Wise, eds., *The Youth Labor Market Problem: Its Nature, Causes, and Consequences*. Chicago: The University of Chicago Press, pp. 115-54.

Freeman, Richard B., Wayne Gray, and Casey E. Ichniowski. 1981. "Low Cost Student Labor: The Use and Effects of the Subminimum Wage Provisions for Full-Time Students." In *Report of the Minimum Wage Study Commission*. Volume 5, pp. 305-35.

Katz, Arnold. 1973. "Teenage Employment Effects of State Minimum Wages." *Journal of Human Resources*, Volume 8, Number 2 (Spring), pp. 250-56.

Katz, Lawrence, and Alan B. Krueger. 1992. "The Effect of the New Minimum Wage Law in a Low-Wage Labor Market." *Industrial and Labor Relations Review*, Volume 46, Number 1 (October 1992), pp. 6-21.

Lester, Richard A. 1946. "Shortcomings of Marginal Analysis for Wage-Employment Problems." *American Economic Review*, Volume 36, Number 1 (March), pp. 63-82.

Mincer, Jacob. 1976. "Unemployment Effects of Minimum Wages." *Journal of Political Economy*, Volume 84, Number 4 (August, Pt. 2), pp. S87-S105.

Minimum Wage Study Commission. 1981. *Report of the Minimum Wage Study Commission*. Washington, D.C.: U.S. Government Printing Office.

BEST COPY AVAILABLE

Neumark, David, and William Wascher. 1992. "Employment Effects of Minimum Wages and Subminimum Wage Provisions from Panel Data on State Minimum Wage Laws." *Industrial and Labor Relations Review*, Volume 46, Number 1 (October 1992), pp. 55-81.

Questor, Aline O. 1981. "State Minimum Wage Laws, 1950-1980." In Minimum Wage Study Commission. Volume 2, pp. 23-152.

Swidlinsky, Robert. 1980. "Minimum Wages and Teenage Unemployment." *Canadian Journal of Economics*, Volume 13, Number 1 (February), pp. 158-71.

Wachter, Michael L. and Choongsoo Kim. 1982. "Time Series Changes in Youth Joblessness." In Richard B. Freeman and David A. Wise, eds., *The Youth Labor Market Problem: Its Nature, Causes, and Consequences*. Chicago: The University of Chicago Press, pp. 155-85.

Welch, Finis, and James Cunningham. 1978. "Effects of Minimum Wages on the Level and Age Composition of Youth Employment." *Review of Economics and Statistics*, Volume 60, Number 1 (February), pp. 140-45.

EMPLOYMENT POLICIES INSTITUTE

RECENT PUBLICATIONS FROM THE EMPLOYMENT POLICIES INSTITUTE

Date	Title
February 1993	"Employment Effects of Minimum and Subminimum Wages: Recent Evidence," by David Neumark, University of Pennsylvania.
January 1993	"Mandated Health Insurance, the Low-Wage Employee, and the Distribution of Income," by Dwight R. Lee and Ronald S. Warren, University of Georgia.
September 1992	"The Value of Part-Time Workers to the American Economy: How Mandated Benefits Will Undercut the Welfare of Part-Time Workers," by Richard B. McKenzie, University of California-Irvine and Washington University, St. Louis.
March 1992	"Higher Wages, Greater Poverty: Trapping Americans in Poverty," by Carlos E. Bonilla, Bonilla and Associates. Examination of the interaction between minimum wage hikes, earnings, and transfer tax programs in California.
February 1992	"The Employment Effects of the FICA Tax on Restaurant Tip Income," by Richard Vedder and Lowell Gallaway, Ohio University.
February 1992	"Survey of Service Employees," prepared by Frederick/Schneiders Inc. Survey of current and former hospitality industry employees, exploring the relevance of those jobs to the development of important job skills.

Also available from the Employment Policies Institute:

April 1992	"Jobs-at-Risk and Their Demographic Characteristics Associated with Mandated Employer Health Insurance: An Analysis of the 'Play' Provisions of a 'Play or Pay' Health Insurance Plan," prepared for the Partnership on Health Care and Employment by CONSAD Research Corporation.

For copies of these reports or for further information about the Employment Policies Institute, please call 202-347-5178.

Suite 1110, 607 14th Street, N.W. • Washington, D.C. 20005 • (202) 347-5178 • Fax: (202) 347-5250